Evidence Synthesis in the Biological Sciences

64 Survey Response Data to date

Phase 2 Interview Questions

Survey question 1

I can best be described as...

Faculty	23
Student	19
Staff	10
Other	10

Other: recent grad, consultant, postdoc, postdoc researcher, head of environmental NGO and postgraduate student, government consultant, research assistant, NGO scientist, government policy consultant...

Survey question 2

On a scale of 1 (not confident at all) to 5 (Extremely confident), how would you rate confidence in your ability to conduct evidence synthesis-based research?

Confidence level	1	2	3	4	5
Responses	1	7	10	28	16
Percentage	1.6	11.0	15.6	43.8	25.0
n=64					

Survey question 3

What training e.g. course(s), seminars, informal learning... informed your understanding of evidence synthesis research practices?

- The experience of teaching for more than thirty years in this field.
- Systematic review seminar
- Primarily 'learning-by-doing' through extensive publication experience. This includes staying updated with current literature on synthesis methods and collaborating with domain experts.
- Informal learning and discussion with our senior colleagues.

- My MSc-course in Conservation Biology provided the basis for evidence-based research - For a specific systematic review, I read up on corresponding peer-reviewed literature and familiarized myself with the Systematic Reviews and Meta-Analyses framework (PRISMA).
- CEE training workshops, advanced level
- Online seminars, informal learning, published literature
- Reading relevant literature and having conducted a systematic map and a systematic review. Publishing the peer-reviewed protocol first also helped.
- I'm a certified [name redacted] synthesis trainer. I have been involved in numerous Systematic Reviews and Systematic Maps as lead author or co-author. I have also been involved in various traditional literature reviews and stand-alone meta-analyses. I have also prepared and delivered a number of training workshops on evidence synthesis for government and academia.
- Trained directly by an expert in research synthesis [name redacted]
- I hadn't really learned much about synthesis research until I was asked to be a part of the project. I learned how to do it based on help from the PhD student on the project.
- In collaboration with one of my colleagues.
- Education.
- Nothing really other than working with team members, reading scholarly articles that critique this methodology and point out how environmental and ecological studies should have a course book, open notebook or certification process if only to help us meet standards.
- I was involved in the writing of several synthesis papers and learned from co-authors who were more experienced than I.
- Informal learning and consultation with university librarian staff.
- Gained experience by attending a workshop long ago, my only official training to date.
- No real training, work as a group of researchers that have this collective experience.
- Thesis research, Reading published synthesis research papers, Reading papers about synthesis research.
- I went to one seminar. I was mostly shooting from the hip.
- I learned approaches for systematic review during my undergraduate degree and then expanded on this knowledge through a couple of seminars offered by subject librarians. I then participated in a systematic review as a coauthor before leading one myself. During both of these reviews, I/the team did additional research (YouTube videos, websites, articles) to ensure proper approaches.
- Graduate studies research methods course - that just touched on this methodology. I picked this up with faculty colleagues on our own and previous studies.
- Mentorship from my PI.
- Nothing really, as a new graduate student without this experience I looked around and found nothing that would help with all the facets of this research methodology including meta-analysis and systematic reviews which is hard to believe noting how many conservationists are using, performing, and creating policy as a result of these studies. Why is this so?

- Informal studies and resources on the Internet. No formal resources exist within this disciplinary research group. Maybe one day.
- Seminar and informal learning.
- I have participated in many evidence synthesis projects at various scales and have learned a lot from them. I have not attended any specific courses to learn that.
- As a new area of research methodologies includes evidence synthesis there is a definite need to create resources and expertise for faculty, staff and students to share experiences, challenges, and new ways of validating research.
- I learned evidence synthesis mostly through self-study (papers, books, Collaboration for Environmental Evidence resources, imitating methods from other studies) and direction from mentors.
- Training with librarian, one or two seminars, reading other evidence synthesis.
- No formal training, learned from doing with expert advice, lots of reading guidelines
- My understanding primarily comes from informal learning and practical experience. While conducting research for my published SCI papers, I engaged in extensive literature review, data extraction, and critical appraisal.
- I read resources that had been prepared to train students in conducting evidence synthesis.
- Most of the courses, workshops talk about the systematic synthesis research practices, but my understanding on this topic is mostly from peer reviewed papers.
- Library workshops.
- Connecting with Research Librarians at the University of [name redacted]; Resources from Covidence (review management website); JBI methodology resources; Cochrane resources.
- Nothing to date other than undergraduate experiences with course assignments.
- No official training, use a variety of CEE resources, but mainly work as a team to ensure viability and best practices borrowing strategies, frameworks… from other successful studies.
- No real training other than being part of research teams where librarians and selective faculty are experts that do quality control and do most of the work.
- I was using the PRISMA guidelines and looked at examples of other published surveys.
- International autumn school "Systematic review and mapping research methods in the context of social and environmental sciences" by [names redacted].
- My understanding of these practices is primarily based on self-directed study and practical application, supported by guidance from colleagues and professors. Additionally, I have expanded my knowledge by attending various lectures organized by MDPI and other seminars hosted by our institution.
- Numerous high-quality international conferences and symposia.
- Seminars and informal learning.
- I have not had any formal training in performing evidence synthesis research. I have had informal discussions about performing evidence synthesis research with mentors, peers, etc.

- The experience of conducting a literature review for publication, mentorship and discussion with the lead author helped me learn how these are conducted and the steps/thought processes.
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- The practice done with-in the expert group on criteria how to exclude. The education delivered by the journal.
- Seminars and informal learning.
- Well-organized training from the project leader from [name redacted].
- Participated in several academic and society webinars, reviewed appropriate methodology papers e.g. James, K. L. et al 2016, and relied on the expertise of research team members.
- Thesis research, Reading published synthesis research papers, Reading papers about synthesis research.
- https://environmentalevidence.org/ led workshop, [name redacted] led workshops, https://www.roses-reporting.com/, https://elizagrames.github.io/litsearchr/#, https://files.eric.ed.gov/fulltext/EJ1133498.pdf, Covidence.

Survey question 4

On a scale of 1 (not confident at all) to 5 (Extremely confident), how would you rate confidence in your ability to conduct evidence synthesis-based research?

	Confidence Levels						
	1	2	3	4	5	n	na
Stages of evidence synthesis research							
Develop and register a protocol	5	15	19	11	8	58	4
Draft your research question	8	21	21	9	3	62	0
Select databases	10	22	16	8	4	60	0
Select grey literature sources	3	9	15	17	12	56	6
Create database search strategies	1	12	23	10	15	61	1
Citation / export management	10	25	15	7	3	60	2
Article / citation screening	5	19	20	11	6	61	0
Data selection	5	12	12	24	8	61	1
Risk of bias assessment	0	9	12	22	12	56	6
Quality of data assessment	1	3	16	19	18	57	5
Synthesize, map or describe results	4	9	16	21	9	59	3
Discern impact of resulting research	2	9	20	10	20	61	1

Survey question 5

What is notable or unique when conducting evidence synthesis research specifically in the biological and natural sciences?

- Volumetric data availability.
- High heterogeneity and context-dependency. Unlike clinical trials, ecological studies vary drastically by climate, taxa, and landscape context. This makes data extraction and generalization significantly more complex than in other disciplines.
- In Conservation Biology the range of methods used to research a particular topic (e.g. the effectiveness of policy instruments) is so broad that it is often hard to synthesize research findings.
- lack of standardized research protocols, often making studies set up to measuring the same thing difficult to compare. Often quite vague abstracts, making both searches and screening of records difficult.
- Not sure if this is specific to natural sciences but I felt with syntheses of very diverse data sources often variability is so high that patterns are difficult to find.
- Given the logistical and often financial constraints, research in our field is often deemed low validity ("quality") due to a lack of appropriate comparators and replication in their

study designs. Further, from the topics I have addressed with evidence synthesis in this space, study designs used to address a similar question vary drastically, making the development of risk of bias assessments very challenging to capture all potential risks.

- Notable and unique insights.
- It is thought that evidence synthesis is a simpler or less-valid form of research, so it is an uphill battle to convince colleagues, peer-reviewers and faculty supervisors that this type of research is important, informs policy, and is just simply different. As such, evidence synthesis has a disciplinary bias, is not perfect, but fills a huge research hole when directing policy, recommending change, and sustainability.
- Data selection and concisely describing results is unique given the wide array of data types gathered in biological sciences.
- Although ROSES guidelines are helpful, it is difficult to find a guide that thoroughly outlines the process.
- A great question, I find that identifying the right studies and databases is key to a good research study. There are no real official training material or resources for conducting a valid biological study, so we borrow from health sciences which is fair, but not appropriate when using an ecological lens and discerning data to find good answers to difficult research questions!
- Environmental studies vary greatly by design, research areas and the purpose of each study. It is almost impossible to discern the quality of data, tools used to access results and impacts such that most disciplinary studies do the best they can without rigorous standards, frameworks, and history of peer-review scholarship. There will always be ambiguity in evidence synthesis research, some more than others. Researchers in environmental and ecological studies should instead worrying about bias, assessment, risk, etc. concentrate efforts on the use and application to real-world policy.
- In my experience the results are often described as less impactful at the stage of peer review, more so then when conducting experimental analysis. Systematic reviews are reliant on accurate characterization of the current literature. If the literature is not robust enough to measure significant effect, then it is our job to report that accurately, which is difficult when many people have been trained to associate "significance" with "impact".
- Well, I did a smaller one with just a group of undergraduates which was like wrangling cats at certain points but twice as rewarding!
- There are both controlled experimental studies and an often a plethora of observational data. Weighing these very different types of evidence can be challenging and is somewhat unique to the natural sciences. For example, in ecology, there may have been experiments looking at temperature impacts but there are also real observations in nature of species responding to temperature. How do we weigh these different types of evidence when drawing inferences or conclusions?
- There is a lot of misinformation on this research design, some researchers don't call it science, while others call it the leading edge of qualitative assessment going forward. Who’s right?
- This type of research guides policy decisions when delivered to the appropriate governmental agencies which sounds appropriate, but there are questions as to the validity, bias, and quality of data that come from these studies that mitigates its impact.

- Research elaborations.
- Evidence synthesis research in the biological sciences is just starting to evolve and be critiqued in many peer-review communities. Difficulties similar to this type of research in all disciplines includes the validity of data, minimizing bias, accessing data, discerning the quality of analysis, and communicating this to researchers, policy makers and the general public. Mobilizing this knowledge for impact is of great importance when attempting to address current and sustainable research that makes a difference.
- In the biological and natural sciences, we are often including studies that were conducted using different methods in a variety of locations and conditions. This causes studies to have various levels of error/confounding/bias/reporting and often results in syntheses having large amounts of heterogeneity. Also unique in the biological and natural sciences is that relevant studies are often conducted by government, NGOs, or as part of environmental impact assessments. These studies are often not published in peer-reviewed journals or indexed in scientific databases; consequently, relevant studies are often not found by typical search strategies.
- Implementation of findings from evidence synthesis in biological and natural sciences is limited. While it may be used to inform broad recommendations, specific management objectives are typically thought to require/rely on location specific studies. This is problematic if decisions are based on a single empirical study (which may be susceptible to error) rather than drawing upon the literature base.
- Most critical appraisal tools are based on medical sciences, although there is one for environmental sciences now. There are several uncontrollable biases in ecology, for example blinding is not done, and there will always be confounding variables involved. I ended up scoring all studies as having medium and high risk of bias.
- The effectiveness of landscape interventions is highly dependent on local climatic and urban contexts. Generalizing findings across different cities requires careful analysis of these confounding variables.
- The variation in data collection and measurement can make it challenging to compare like with like.
- Individual's perspective and bias influence the results and that is the most notable outcome.
- Biological and natural.
- The biological and natural sciences encompass a wide range of research topics and questions. As a result, challenges may arise when considering what sector may benefit most from the findings of the research synthesis. Further, if the research synthesis being conducted involves climate change as a factor, evidence in the current body of literature may be limited due to the novelty of the research area.
- Wish there was a textbook or open handbook that detailed how ecology evidence synthesis research methodologies for systematic reviews and meta-analyses were available for students, new researchers and research teams wanting to meet if not exceed scholarly standards for publication and implementation.
- The field of evidence synthesis is so new that it is almost impossible to discern impact of good, bad and indifferent studies when determining validity, quality, and scholarship.

- The basis of evidence synthesis work in the biological and ecological sciences is the quality of data gleaned from independent scholarly peer-reviewed publications and reports. If the data is incomplete or fails to be reliable - then there isn't anything evidence synthesis can do to make the analysis whether quantitative or qualitative any better or more trustworthy. Although this may be true for all evidence synthesis work - bioscience data by its very nature creates further ambiguity that is hard to discern and comment on when in this paradigm attempting to resolve, comment on, and institute policy.
- Conducting a synthesis research study, such as the systematic literature review, I performed, provides a truly comprehensive overview of a subject, significantly broadening one's horizons. While I began with a preliminary hypothesis, the rigorous process of systematically gathering and evaluating almost all relevant evidence led to surprising conclusions. Crucially, this method forced the evidence into a structured framework. This not only allowed for systematic conclusions on the research question itself but also enabled the organization of existing knowledge on a much broader scale.
- Quantitative analysis is typically the focus, more so than for social sciences.
- The most notable difference is the high heterogeneity of the data.
- To be absolutely objective, not to mislead.
- In my experience, articles in the natural sciences are much less standardized. It is more difficult to compare effect sizes across different papers, and hard to categorize papers or select data.
- I think natural systems have a lot more variability between them especially in environmental systems, where there is a lot less of an ability to control things in an experimental way. so, comparing research across different environments can be very complex and you must be more cautious on what you can claim the impact of this type of review to be.
- Grey literature can be challenging to find, obtain, and extract data from since they are often reports, and older ones might be paper copies that have not been converted to pdfs.
- Biological sciences evidence synthesis research methodologies is a newer phenomenon relative to health and medical sciences equivalents. This newness causes issues with the quality of research studies and their validity without the strength and critical appraisal of best practices, oversight, editorial control, frameworks, and discernment of the quality of data selected, ambiguity of screening, mapping data to research questions, and discerning impact when in this discipline adding knowledge to a body of literature and resulting application to policy on many different levels. It must be noted that evidence-based research is not perfect. It never will be. Researchers together with government and consulting scientists must discern the validity of findings while recognizing the influence of bias, limitations of this research methodology and limited number of studies to draw upon in most cases. There is a place for evidence-based analysis and meta-analysis, but time will tell whether these studies either contribute or take away from the body of research so carefully and painfully created over time and space.